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SOLUTIONS OF PROBLEMS IN NUMBER ONE.

SOLUTIONS of problems in number one have been received as follows:

From J. M. Arnold, 99 and 103; Prof. W. W. Beman, 101; Prof. P. E. Chase, 98, 99, 101, 102, 105 and 106; Prof. A. B. Evans, 100, 101, 102, 103, 104 and 105; Dr. H. Eggers, 99, 101 and 103; E. S. Farrow, 98, 99 and 102; G. W. Hill, 102 and 103; H. Heaton, 99, 100, 101, 102, 103 and 105; Prof. W. W. Johnson, 103; Prof. H. T. J. Ludwick, 105; Christine Ladd, 106; Artemas Martin, 102, 104 and 105; Dr. A. B. Nelson, 102 and 105; H. Nevington, 99; O. D. Oathout, 99, 103 and 104; L. Regan, 102 and 103; E. B. Seitz, 99, 100, 101, 102 and 103; Prof. M. C. Stevens, 99 and 102.

98.—"A stream of water moves at the rate of 9 miles an hour, with a fall of one foot per mile; what is the momentum of the water per square foot?"

99.—"Two points are given. Without using a ruler—that is with a pair of dividers only—to determine two other points which, with the first two, form the four vertices of a square."

SOLUTIONS BY PROF. P. E. CHASE, PHILADELPHIA, PA.

$$M = 1 \times \frac{9 \times 5280}{3600} \times 62\tfrac{1}{2}; \qquad V = \frac{9 \times 5280}{3600}; \qquad MV = 10988.$$

99. Describe a regular hexagon, *abcdef*, *a*, *b* being the given points and *o* the centre. With *a* and *b* as centres describe arcs *fo*, *oc*. With *e* and *d* as centres describe arcs tangent to *fo*, *oc*. The tangent points are the points required.

[For want of room we are compelled to defer the remaining solutions till the issue of No. 3, in which we will publish solutions as follows:

Of 101 by Prof. Beman; of 102 by E. B. Seitz; of 103 by H. Heaton; of 104 by Prof. Evans; of 105 by Prof. Ludwick and of 106 by Prof. Chase.]

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and, 2ndly: Because in the construction of eqn. (8) the conclusion is virtually assumed; for, let the resultant, *MN*, cut the radius *BC*, then because the force *F* is necessarily a positive quantity and the angle *CNH* is greater than angle *CHN*, we have

$$\frac{FR[\sin(\theta - CHN) - \sin CHN]}{\frac{7}{5}mR^2} = \frac{d^2\theta_1}{dt^2} \; (8); \quad \tfrac{2}{5}m'r\frac{d^2\theta_2}{dt^2} = \frac{-5mR^2 + m'[2r^2 + 5(R+r)^2]}{5R}\frac{d^2\theta_1}{dt^2}. \; (11)$$

$$\therefore \quad NC : R :: -5mR^2 + m'[2r^2 + 5(R+r)^2] : 2mR^2 + m'[2r^2 + 5(R+r)^2],$$

in which the *second* term of the second couplet is greater than the *first* by $7mR^2$. But becaus in constructing eqn. (8) it is not known which of the two angles, *CHN* or *CNH*, is the greater, therefore, in assuming that *CHN* is the greater, the conclusion arrived at is virtually assumed. Besides, the proportion here obtained is manifestly not true, because it implies a constant angle at *N*, and we know the initial value of *N* is zero when $a = 0$.—Ed.